WV-0221#3

UNION CARBIDE INTERNAL CORRESPONDENCE

SILICONES & URETHANE INTERMEDIATES P. O. BOX 8361, SOUTH CHARLESTON, WEST VIRGINIA 25303

To (Name) Mr. R. E. Crum
Division Mr. C. E. Fry
Location H. W. Himes, M.D.
R. W. Holland, M.D.
Mr. R. D. Nelson
Ms. F. M. Plechaty
Mr. M. C. Polniaszek

Date June 7, 1983

Originating Dept. Safety & Health

Subject Corporate Policy Draft - Medical Surveillance of Respirator Wearers

Copies: Mr. H. E. Bishop
Mr. R. O. Cavender/R. P. Campbell
Mr. E. B. Harris
Mr. T. E. Lawrence
Mr. L. E. McClure
Mr. J. B. Mickey
Mr. D. G. Moshier

PLAINTIFF'S EXHIBIT
UC-2177

Attached for your review and comments is a draft of a Corporate Category II policy related to determining the capability of employees to wear respiratory protection equipment.

Please let me know your comments or suggestions for changes to this proposed policy/procedure by June 30th.

Very truly yours,

J. S. Cornell

JSC:ke
Ext. 2618

Attachment

How many employees have to wear resp.?



Union Carbide trial exhibit UC-2177: Corporate Policy Draft on Medical Surveillance of Respirator Wearers, with J.... Published by AsbestosClaims.Law
ACL Doc 17190 · Page 1 of 22 asbestosclaims.law/library/17190/1

UNION CARBIDE

INTERNAL
CORRESPONDENCE

RECEIVED BY
JUN 6 1983
J. B. CORNELL

UNION CARBIDE CORPORATION OLD RIDGEBURY ROAD, DANBURY, CT 06817

| | | | |
|---|---|---|---|
| To (Name) Division Location Area | GOHC (General Occupational Health Committee) | Date | June 3, 1983 |
| | | Originating Dept. | Corporate Medical/HS&EA |
| | | Area | Danbury, P2594 |
| Copy to | Divisional Employee Relations Managers<br>General Safety Committee | Subject | Category II Policy<br>Medical Surveillance of Respirator Wearers |

Enclosed is a draft of a Category II policy on Medical Surveillance of Respirator Wearers. Included with it are minimum criteria for medical evaluation of respirator wearers and guidelines for UCC physicians regarding medical contraindications to respirator usage. You will notice that Berlie Barton, Harry Rhodes and Bob Ondocsin were on the committee chaired by T. Guy Fortney which developed this policy.

Please review this draft policy within the next 30 days and send your comments to me. If you have any questions about the details of any of these documents, please call us.

Thomas A. Lincoln, M.D.
Corporate Medical Director

TAL:cms
enclosure
c: With Cover Letter Only
B. Ballantyne, M.D.
T. G. Fortney, M.D.
A. A. Lang, M.D.
H. C. Lewinsohn, M.D.
M. J. Makowsky, M.D.

With Final Draft
J. B. Browning
R. W. Cope
R. D. Ondocsin
A. G. Voress



*Union Carbide trial exhibit UC-2177: Corporate Policy Draft on Medical Surveillance of Respirator Wearers, with J....* Published by AsbestosClaims.Law
ACL Doc 17190 · Page 2 of 22 asbestosclaims.law/library/17190/2

UNION CARBIDE

CORPORATE OCCUPATIONAL MEDICAL MANUAL

| SUBJECT | SECTION |
|---|---|
| MEDICAL SURVEILLANCE OF RESPIRATOR WEARERS | POLICIES/PROCEDURES |
| | DATE 4/13/83 — PAGE 1 OF 3 |
| | APPLIES TO [X] UNITED STATES [ ] INTERNATIONAL |

PURPOSE/BACKGROUND

The Corporate Occupational Medicine Policy prescribes a coordinating role to the Health, Safety and Environmental Affairs Department with the duty and authority to develop and issue policies, procedures, and objectives for medical examinations, including surveillance examinations.

As a part of the program to protect the health of employees potentially exposed to identified toxic materials or biological substances requiring the wearing of respiratory protective devices, the Corporation requires such employees to have a medical evaluation and be certified as able to use the device without risk to the particular employee or others in the work environment concerned.

The wearing of respirator protection devices (respirators) may impose some physiological and psychological stress on the wearer. It is, therefore, necessary to perform a medical evaluation of the employee prior to initial use and periodically thereafter.

POLICY

1. All employees who will wear respirators, regardless of the frequency of use, will be required to have medical evaluations prior to fit testing or usage. A register of such employees shall be maintained by Component Management.



*Union Carbide trial exhibit UC-2177: Corporate Policy Draft on Medical Surveillance of Respirator Wearers, with J....* Published by AsbestosClaims.Law
ACL Doc 17190 · Page 3 of 22 asbestosclaims.law/library/17190/3

2. Medical evaluation may be accomplished by the use of the pre-placement examination, the basic periodic medical examination and an annual re-evaluation as outlined in "Minimum Criteria for Medical Evaluation of Respirator Wearers", developed in conjunction with this policy.

3. When an employee is assigned work requiring the wearing of a respirator, the UCC physician may certify the employee to wear a respirator based on a review of a previous medical evaluation provided it was performed within the preceding twelve months.

4. If an employee elects to wear a respirator in a situation where it's use is not mandated or considered necessary by the Component Facility, a medical evaluation is nevertheless required. If the Component Facility makes the respirator available on a voluntary basis, the Component will become responsible for ensuring the medical evaluation be performed in accordance with the preceding items 1-3 of this policy.

5. The UCC physician rendering the medical opinion after evaluation of a prospective respirator wearer shall be provided the following information by management.*

   A. Physical requirements of the job.

*APPENDIX I



Union Carbide trial exhibit UC-2177: Corporate Policy Draft on Medical Surveillance of Respirator Wearers, with J....
Published by AsbestosClaims.Law
ACL Doc 17190 · Page 4 of 22
asbestosclaims.law/library/17190/4

B. Stresses involved, i.e., asbestos, paints, carcinogens, solvents, etc.

C. The type of respirator to be worn.

6. Employees who have medical approval to wear contact lenses, regardless of work area, will not be permitted to wear a full-face respirator, helmet or hood.

SCOPE

This policy applies to all parts of Union Carbide in the United States and Puerto Rico.

REFERENCES

1. Corporate Occupational Health Manual, Policy/Procedures for Medical Examinations.
2. Corporate Occupational Health Manual, Policy/Procedures for Respiratory Protection.
3. OSHA General Industry Standards, 29 CFR 1910.134.

Advice and Service: Corporate Occupational Medical Director
Old Ridgebury Road
Section P-2
Danbury, Connecticut 06817

- END -



*Union Carbide trial exhibit UC-2177: Corporate Policy Draft on Medical Surveillance of Respirator Wearers, with J....* Published by AsbestosClaims.Law
ACL Doc 17190 · Page 5 of 22 asbestosclaims.law/library/17190/5

UNION CARBIDE

| SUBJECT | SECTION |
|---|---|
| MINIMUM CRITERIA FOR MEDICAL EVALUATION OF RESPIRATOR WEARERS | GUIDELINES/INFORMATION |
| | DATE 4/13/83 — PAGE 1 OF 4 |
| | APPLIES TO [X] UNITED STATES [ ] INTERNATIONAL |

GENERAL

The Corporate policy titled Medical Surveillance of Respirator Wearers establishes requirements for the medical evaluation and certification of employees who will wear respirators. These guidelines may be used by components to assist them in developing their detailed medical evaluation procedure.

MINIMUM CRITERIA

Pre-Placement Examination:

The UCC physician who performs the pre-placement examination shall be informed if the prospective employee is required to wear a respirator in the normal course of his/her work. The examining physician shall determine the employee's ability to do so. The results of this determination shall be transmitted to plant management in writing.*

1. The minimum requirements of the pre-placement examinations shall be:

   a. Completion of UCC Form 186-90, revised 2-80 or equivalent.

   b. Physical examination

   c. Chest x-ray (Postero-anterior view 14" x 17")

*APPENDIX I



Union Carbide trial exhibit UC-2177: Corporate Policy Draft on Medical Surveillance of Respirator Wearers, with J....
Published by AsbestosClaims.Law
ACL Doc 17190 · Page 6 of 22
asbestosclaims.law/library/17190/6

d. Pulmonary function testing, to include Forced Vital Capacity (FVC), Forced Expiratory Volume in one second ($FEV_1$), $FEV_1$/FVC ratio, a comparison of the determined and predicted values and a graph for permanent retention.

e. Electrocardiogram

f. Audiogram

g. Visual/Acuity, Depth and Color Perception

h. Complete Blood Count

i. Urinalysis

j. If the employee is to be working in an area where there is potential for exposure to significant chemical of physical stresses, a panel of blood chemistry tests should be added to the pre-employment examination.

Basic Periodic Examination:

After the initial evaluation of the employee's ability to wear a respirator, there shall be periodic evaluations in accordance with the schedule and requirements for the basic periodic examination in Corporate Policy: Medical Examinations, to certify the employee's suitability to continue use of a respirator. Pertinent statutory or regulatory requirements for persons exposed to specific hazardous materials or conditions requiring more frequent examinations will take precedence over this scheduling.



Union Carbide trial exhibit UC-2177: Corporate Policy Draft on Medical Surveillance of Respirator Wearers, with J....
ACL Doc 17190 · Page 7 of 22
Published by AsbestosClaims.Law
asbestosclaims.law/library/17190/7

1. Scheduling

   a. Every five years for employees age 35 or younger.

   b. ~~Every two and one-half years~~ for employees 36-50 years of age.

   c. Yearly for employees over 50 years of age.

2. Minimum requirements for the basic periodic examination shall be:

   a. Interval history using medical form UCC 275-26, 5/82 or equivalent.

   b. Physical examination.

   c. Pulmonary function testing, to include Forced Vital Capacity (FVC), Forced Expiratory Volume in one second ($FEV_1$), $FEV_1$/FVC ratio, a comparison of the determined and predicted values and a graph for permanent retention. A careful and detailed respiratory history is an important part of the pulmonary function evaluation.

   d. Electrocardiogram every five years for employees over the age of 45. Required for employees with a history of heart disease with each scheduled examination.

   e. Chest x-ray every five years unless exposed to pulmonary irritants or has symptoms of lung disease.

   f. Complete Blood Count.



*Union Carbide trial exhibit UC-2177: Corporate Policy Draft on Medical Surveillance of Respirator Wearers, with J....* Published by AsbestosClaims.Law
ACL Doc 17190 · Page 8 of 22 asbestosclaims.law/library/17190/8

g. Urinalysis.

h. Audiometric test every five years unless exposed to noise at or above 85 dBA TWA.

i. Visual acuity, depth and color perception.

j. Any other test determined to be necessary by the physician.

Annual Re-Evaluation

Those years that a basic periodic examination is not performed, there shall be a medical determination of the employees ability to continue wearing a respirator based on any pertinent changes in health status which have occured in the preceding 12 months. A questionnaire may be used to establish the health status of registered respirator wearers. The initial screening in the annual review process may be conducted by the company nurse, if present, or by the Respirator Program Administrator, with the prior approval of the UCC physician using as a minimum requirement the Respirator Wearers Annual Review Questionnaire.** The questionnaire may be expanded by the UCC physician. If there is a positive response to any of the questions on the questionnaire, the employee must be referred to the UCC physician for further examination. The UCC physician may examine the employee or perform those tests that he feels are necessary to make this annual medical determination of the employee's ability to continue wearing the respirator safely. If there are no positive responses; the employee may continue the use of a respirator for another 12 months.

**APPENDIX II

- END -



Union Carbide trial exhibit UC-2177: Corporate Policy Draft on Medical Surveillance of Respirator Wearers, with J.... Published by AsbestosClaims.Law
ACL Doc 17190 · Page 9 of 22 asbestosclaims.law/library/17190/9

| SUBJECT | SECTION |
|---|---|
| GUIDELINES FOR UCC PHYSICIANS REGARDING MEDICAL CONTRAINDICATIONS TO RESPIRATOR USAGE | GUIDELINES/INFORMATION |
| | DATE — PAGE 1 OF 7 |
| | APPLIES TO ☒ UNITED STATES ☒ INTERNATIONAL |

GENERAL

It is the responsibility of the UCC physician to determine the health status of all job applicants and employees who may be required to wear respiratory protection equipment in the performance of their duties. As there is little published information available on the adverse physiological effects of wearing a respirator, it is difficult for a physician to precisely identify medical contraindications to respirator usage. The only practical approach is to treat each case individually, using the best medical judgement available, and to consider the physical characteristics and disadvantages of the various types of respirators.*

Appendix III lists the general types of respirators and some of the stress factors that may be anticipated with their usage. Air purifying respirators resist inhalation because the filter or cartridge restricts free air flow. Exhalation is also more difficult because the expired air must force open a valve for release. The bulk and weight of some self-contained breathing apparatus (SCBA's) are a significant burden and could aggravate inguinal hernia or place additional stress on the cardiovascular system. Wearers of airline respirators and hoods may have to drag around several hundred feet of air supply hose. If the worker's

*APPENDIX III



Union Carbide trial exhibit UC-2177: Corporate Policy Draft on Medical Surveillance of Respirator Wearers, with J.... Published by AsbestosClaims.Law
ACL Doc 17190 · Page 10 of 22 asbestosclaims.law/library/17190/10

cardiovascular or pulmonary system is impaired, wearing a respirator could constitute an unacceptable risk.

Based on the overall health of the individual, special medical tests and the physical examination, the physician shall determine whether an employee may wear a respirator safely or whether an employee should be restricted from wearing respiratory protection equipment. If a restriction is recommended, appropriate management must be notified in writing using the form given in Appendix I.

GUIDELINES

Pulmonary Disease Consideration:

If an individual has emphysema, chronic obstructive pulmonary disease, restrictive pulmonary disease, bronchial asthma or x-ray evidence of pneumoconiosis, a physician should determine whether or not a respirator can safely be worn.

Performance on pulmonary function testing will be a major factor in this determination. A moderate to severe ventilatory abnormality is technically defined as:

1. $FEV_1$ less than 60% of predicted.
2. FVC less than 60% of predicted.
3. $FEV_1$/FVC ration less than 60% of predicted.



Union Carbide trial exhibit UC-2177: Corporate Policy Draft on Medical Surveillance of Respirator Wearers, with J....
Published by AsbestosClaims.Law
ACL Doc 17190 · Page 11 of 22
asbestosclaims.law/library/17190/11

These readings could result in an employee being under excessive stress while wearing a respirator and result in injury. The individual with this abnormality needs to have close observation and questioning. A careful and detailed pulmonary history may reveal that he/she is able to climb steps and walk up a grade without difficulty and could safely perform tasks wearing a respirator.

There may be x-ray evidence of pneumoconiosis but no functional impairment is demonstrated.

The asthmatic who has difficulty only at the time of an upper respiratory infection or seasonally may be able to function normally except at a time of an acute attack. Some arrangements, which must be accomplished in writing, could be made with supervision for his/her utilization.

Cardiovascular:

Cardiovascular impairment should always be treated with more concern than pulmonary impairment because of its potential sudden catastrophic consequence. Applicant or employees who have the following conditions must be evaluated very closely. For this group it is wise to seek consultation with the individual's family physician or cardiologist and let this physician be a part of the decision making process.



Union Carbide trial exhibit UC-2177: Corporate Policy Draft on Medical Surveillance of Respirator Wearers, with J.... Published by AsbestosClaims.Law
ACL Doc 17190 · Page 12 of 22 asbestosclaims.law/library/17190/12

1. Class 2 (or worse) organic heart conditions as defined in the American Medical Association's Guidelines to the Evaluation of Permanent Impairment.
2. Uncontrolled hypertension.
3. History of a previous heart attack.
4. Coronary by-pass surgery.

Other Conditions

Other medical conditions are generally less important in terms of ability to wear a respirator but should be considered.

1. Epilepsy may be a contraindication to wearing a respirator as hyperventilation could precipitate a seizure.
2. Insulin dependent diabetics prone to hypoglycemic episodes may need to be excluded from wearing a respirator as the additional work involved in wearing a respirator could precipitate a hypoglycemic episode and place the individual and others at risk.
3. Claustrophobia requires special consideration. Some employees may use this to keep from wearing a respirator or to be relieved from jobs requiring the use of a respirator. It is, therefore, essential that the physician make a determination of the validity of the employee's phobic complaint.



*Union Carbide trial exhibit UC-2177: Corporate Policy Draft on Medical Surveillance of Respirator Wearers, with J....* Published by AsbestosClaims.Law
ACL Doc 17190 · Page 13 of 22 asbestosclaims.law/library/17190/13

Questions which may be useful include the following: Has the individual ever worn a respirator before? What types of response occured? How long was the individual able to wear the respirator without experiencing symptoms of fear? The real danger of a phobic individual is that he or she could rip off a respirator in a toxic environment. The examining physician may wish to have a psychiatric evaluation of the individual's complaint.

4. A perforated eardrum is reported to have the potential of permitting toxic gases to be inhaled when using a negative pressure respirator. It is important to question the employee/applicant with a perforated eardum about whether they can blow air through their eustachian tube.

5. Facial hair lying between the sealing surface of the respirator and the wearer's skin will always prevent a good seal. Company policy does not allow respirator wearers to have facial hair at the point of sealing. Black employees may have a condition known as Pseudofolliculitis barbae which prevents them from shaving daily, therby causing a serious problem in wearing a respirator. The U.S. Navy has found that sealing requirements



Union Carbide trial exhibit UC-2177: Corporate Policy Draft on Medical Surveillance of Respirator Wearers, with J....
Published by AsbestosClaims.Law
ACL Doc 17190 · Page 14 of 22
asbestosclaims.law/library/17190/14

can be met by shaving every second to third day using 000 barber clippers. The employee or applicant with this condition should be offered this alternative before placing a permanent restriction of respirator usage.

6. Some individuals develop a sensitivity to the rubber of the respirator mask. This can usually be overcome by changing to a respirator with a synthetic facepiece.

7. An individual with a complete loss of the sense of smell would have difficulty with a qualitative fit test, the ability to recognize canister breakthrough or may be unable to recognize odors requiring immediate respirator usage.

8. Certain devices require dexterity in the connection and disconnection of parts and for the manipulation of valves and fittings during use. Persons with missing or disabled fingers may have difficulty in using these devices, particularly in an emergency when help may not be available.

It may be necessary to allow the individual in question to wear the required respirator under close medical supervision and monitor his/her ability to perform the required job duties.



*Union Carbide trial exhibit UC-2177: Corporate Policy Draft on Medical Surveillance of Respirator Wearers, with J....* Published by AsbestosClaims.Law
ACL Doc 17190 · Page 15 of 22 **asbestosclaims.law/library/17190/15**

UNION CARBIDE

| SUBJECT | SECTION |
|---|---|
| GUIDELINES FOR UCC PHYSICIANS REGARDING MEDICAL CONTRAINDICATIONS TO RESPIRATOR -USAGE | GUIDELINES/INFORMATION |
| | DATE 4/13/83 — PAGE 7 OF 7 |
| | APPLIES TO [X] UNITED STATES [ ] INTERNATIONAL |

The medical determination of physical ability to wear a respirator safely will be left to the individual UCC physician after examining and questioning applicant/employee. This information, coupled with the type of respirator to be worn, type of work to be performed, and the contaminant to be encountered, will enter into the physician's opinion that will then be related to Management for final action.

END

#2643B



*Union Carbide trial exhibit UC-2177: Corporate Policy Draft on Medical Surveillance of Respirator Wearers, with J....* Published by AsbestosClaims.Law
ACL Doc 17190 · Page 16 of 22 asbestosclaims.law/library/17190/16

CONFIDENTIAL

APPENDIX I

AUTHORIZATION FOR EXAMINATION DATE_____

Examinee's Name_____

Employee's No._____ S.S._____ Job Title_____

Type of Examination:
( ) Pre-Employment ( ) Special Examination (specify)_____
( ) Basic Periodic ( ) Other (specify)_____

Physical Requirements of Job (i.e. heavy lifting, sustained physical effort, light work,....)

_____

Type of Hazards Involved (i.e. noise, asbestos)_____

Respirator to be Worn Type_____ None_____

Types of Tests to be Performed:

_____1) Medical Exam UC 186-90
_____2) Medical Re-exam record Form UC 275-26 5/82
_____3) Physical Exam by Doctor
_____4) Pulmonary Function
_____5) Chest x-ray
_____6) EKG
_____7) Audiogram
_____ 8) Complete Blood Count
_____ 9) Hemoglobin
_____10) Urinalysis
_____11) Visual Acuity, Color & Depth Perception
_____12) Blood Chemistry
_____13) Other (specify)_____

_____
UCC Authorizer

_____
Address

HEALTH STATUS REPORT

The following medical recommendation is based on a review of the medical history, laboratory test results, physical exam and type of physical requirements of the position applied for or occupied by the individual named below.

Applicant/Employee is medically qualified to wear a respirator: ☐ Yes ☐ No

( ) Class A Medically qualified
( ) Class B Medically qualified - Minor controllable defects present (i.e. eyeglasses)
RECOMMEND_____
( ) Class C Medically qualified for modified work only, in accordance with the following
RESTRICTIONS_____
( ) Class D Medically unqualified for job title and job requirements as listed above
( ) Class E Temporarily medically unqualified (i.e. hernia or other correctable problem)

_____

SIGNATURES

Employee and/or applicant has been informed of all abnormalities discovered as a result of this examination.

_____ _____
DATE EXAMINER

_____ _____
DATE EMPLOYEE/APPLICANT

Physician to complete and return to authorizer at above address.
Retain Medical Forms.

UCC 007010

APPENDIX II

RESPIRATOR WEARERS

ANNUAL REVIEW QUESTIONNAIRE

To be answered by employee DATE_____

| LOCATION | DATE | EMPLOYEE NUMBER |
|---|---|---|
| | | |

| NAME (last) | (first) | DEPARTMENT |
|---|---|---|
| | | |

RESPIRATOR TYPE

☐ Dust Mask ☐ Half Mask ☐ Full Face ☐ SCBA ☐ Airline Other:_____

| | YES | NO |
|---|---|---|
| In the past year have you had a prolonged absence due to injury, illness or major surgery. . . . . | ___ | ___ |
| Are you troubled by shortness of breath when hurrying on level ground or walking up a slight hill? . . . . . | ___ | ___ |
| Do you have asthma?. . . . . | ___ | ___ |
| Do you have heart or blood vessel disease? . . . . . | ___ | ___ |
| Do you have fits, spells or seizures? . . . . . | ___ | ___ |
| Do you have chronic lung problems? . . . . . | ___ | ___ |
| Are you bothered with claustrophobia? . . . . . | ___ | ___ |
| Do you have difficulty with taste or smell? . . . . . | ___ | ___ |
| (Only if SCBA will be worn) - Do you have any physical problems which would limit your ability to wear a 35 lb. air pack? . . . . | ___ | ___ |
| Since your last health evaluation, have you been told you have | | |
| diabetes . . . . . | ___ | ___ |
| punctured eardrums. . . | ___ | ___ |
| epilepsy(fits,seizures) | ___ | ___ |
| anemia . . . . . | ___ | ___ |
| Do you know of any reason why you are not able to wear a respirator? | ___ | ___ |

I understand the questions above and have answered to the best of my knowledge. I understand that I have the right to request an examination by a physician.

| SIGNATURE OF EMPLOYEE | DATE |
|---|---|
| | |

UCC 007011

## APPENDIX III

## TYPES OF RESPIRATORS

There are two major classifications of respirators: 1) air purifying and 2) air supplying. Further subclassifications are shown below. Both physiological and psychological stress may be imposed on an individual by respiratory protection equipment.

### I. AIR PURIFYING RESPIRATORS

Air purifying respirators reduce the level of breathing zone air contaminants by means of chemical or mechanical filters. Pressure inside the facepiece will be negative during inhalation and positive during exhalation for all non-powered air purifying respirators. This will increase the resistance of inhalation and exhalation and, therefore, increase the work of breathing.

#### A. Particulate Filter Respirators

Particulate filter respirators provide protection against airborne particulate matter including dust, mists and metal fumes by physicially trapping the particles in a fibrous material as the air passes through the filter media. A negative pressure is created inside the facepiece during inhalation. Breathing resistance will increase as the dust load on the filter increases. (Figure 1) Particulate filter respirators are available as disposable and non-disposable. (Figure 2) In general, the disposable dust mask (Figure 1) imposes less resistance to breathing than the cannister type respirators.

FIGURE 1




DISPOSABLE RESPIRATORS

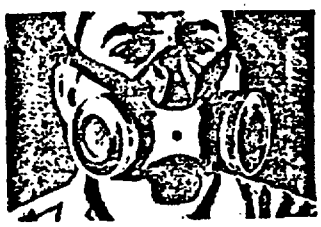
Dust Mask

Particulate or Chemical



*Union Carbide trial exhibit UC-2177: Corporate Policy Draft on Medical Surveillance of Respirator Wearers, with J....* Published by AsbestosClaims.Law
ACL Doc 17190 · Page 19 of 22 **asbestosclaims.law/library/17190/19**

FIGURE 2



HALF MASK



FULL FACE

NON-DISPOSABLE RESPIRATORS
PARTICULATE OR CHEMICAL

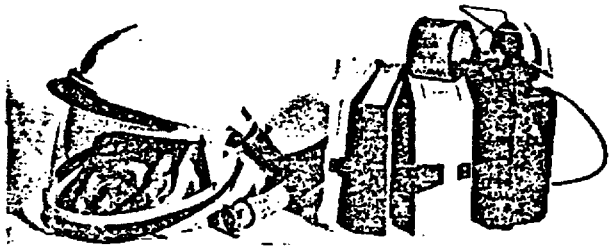
B. Chemical Cartridge Respirators

Chemical cartridge respirators provide protection against certain acid gases and organic vapors. Chemical sorbent cartridges or cannisters absorb or otherwise trap the gaseous and vapor contaminants as the inhaled air passes through them. A negative pressure is created inside the facepiece during inhalation. Breathing resistance will remain relatively stable for the full service life of the cartridge or cannister. Disposable and non-disposable varieties impose roughly equivalent breathing resistance. See Figure 1B and Figure 2.

C. Powered Air Purifying Respirators

Powered air purifying respirators will provide protection against particulates and/or organic vapors depending upon the particular model. Air is forced through a filter or chemical cartridge by a battery operated blower and then supplied to the respirator facepiece under positive pressure. There will be minimal breathing resistance associated with this type of respirator.

FIGURE 3



POWERED AIR PURIFYING RESPIRATOR

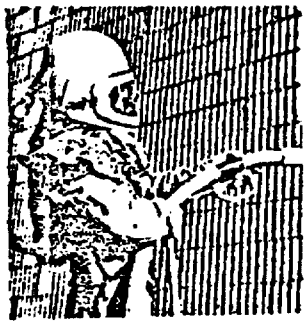


*Union Carbide trial exhibit UC-2177: Corporate Policy Draft on Medical Surveillance of Respirator Wearers, with J....* Published by AsbestosClaims.Law
ACL Doc 17190 · Page 20 of 22 **asbestosclaims.law/library/17190/20**

## II. AIR SUPPLYING RESPIRATORS

Air supplying respirators provide the wearer with a supply of breathing air from a cylinder or compressor and protect against gases, vapors and particulates. Certain types can be used in oxygen deficient atmospheres. Two broad categories of this type of respirator are airline respirators (Figure 4) and self contained breathing apparatus (SCBA) (Figure 5). In the former the respirator is connected by a hose (300 ft. is maximum length) to remote compressed air cylinders or an air compressor. A self contained breathing apparatus is a portable cylinder of compressed air carried by the respirator wearer which may weigh as much as 35 pounds. The length of airline to be handled and the weight of SCBA's are physical stresses to be considered in approving an individual to wear this equipment. Further physiological stress is imposed on the wearer by the design of the air delivery system as defined below.

FIGURE 4





AIRLINE RESPIRATORS

### A. Demand Airflow

Airline respirators and SCBA's may be equipped with demand airflow respirators. This type of regulator supplies breathing air to the respirator "on demand", i.e., when the wearer inhales. Negative pressure is created in the facepiece during inhalation and positive pressure during exhalation. Breathing resistance is minimal with a demand regulator.

### B. Pressure-Demand Airflow

Alternatively, airline respirators and SCBA's may be equipped with pressure-demand airflow regulators. In addition to supplying breathing air to the respirator when the wearer inhales, a small flow of air is continuously supplied to the respirator to maintain a positive pressure within the facepiece. This



*Union Carbide trial exhibit UC-2177: Corporate Policy Draft on Medical Surveillance of Respirator Wearers, with J....* Published by AsbestosClaims.Law
ACL Doc 17190 · Page 21 of 22 asbestosclaims.law/library/17190/21

B. Pressure-Demand Airflow Cont'd

prevents inward leakage of contaminated air during inhalation. A pressure-demand airline respirator or SCBA has a spring-loaded exhalation valve which requires a more forceful exhalation to open. This increased breathing resistance is a consideration in approving an individual to wear respirators equipped with pressure-demand regulators.

FIGURE 5



SELF-CONTAINED BREATHING APPARATUS

C. Continuous Airflow

Airline respirators only, not SCBA's, may be equipped with continuous flow valves which supply a predetermined flow of breathing air to the respirator at all times. Breathing resistance is minimal with continuous flow systems.



*Union Carbide trial exhibit UC-2177: Corporate Policy Draft on Medical Surveillance of Respirator Wearers, with J....* Published by AsbestosClaims.Law
ACL Doc 17190 · Page 22 of 22 **asbestosclaims.law/library/17190/22**